Table 4-6
Dallas/Fort Worth, Texas
Response to Questions 13(c) through 13(e)--Current or Planned Users of Mobile Radio, Cellular, or Paging Services that Are Interested in New Service at Stated Price
(Target Market)

	MEDICAL AND EMERGENCY SERVICES AND SUPPLIES
1. PERCENT LOCATIONS THAT ARE INTERESTED IN NEW SERVICE AND CURRENTLY USE OR PLAN TO USE A MOBILE SERVICE (POSITIVE RESPONSES TO Q13 AND Q4 AND/OR Q5)	1.3%
2. PERCENT LOCATIONS THAT WOULD REPLACE ALL OR SOME OF CURRENT OR PLANNED MOBILE SERVICE WITH NEW SERVICE (YES TO Q13(C))	5.2%
3. PERCENT LOCATIONS THAT WOULD ADD NEW SERVICE TO CURRENT/PLANNED SERVICE (YES TO Q13(D))	2.6%
4. PERCENT LOCATIONS CURRENTLY USING VOICE PAGING (Q13(E)(3))	1.3%
5. LOCATIONS CURRENTLY USING DISPLAY PAGING (Q13(E)(3))	3.9%

Note: Data are from respondents who state (1) they have staff that work outside business location or away from telephone operator/dispatcher but still must remain accessible, (2) they now use or plan to use mobile radio, cellular or paging services, (3) they are interested in new service at stated price (*i.e.*, responded positively to Q4 and/or Q5, Q13).

Table 4-7
Dallas/Fort Worth, Texas
Response to Questions 13(e)--Comments of Paging Users Interested in New Service at Stated Price

	MEDICAL AND EMERGENCY SERVICES AND SUPPLIES
1. PERCENT LOCATIONS THAT BELIEVE RESPONSE FEATURE WOULD GENERATE MORE MESSAGES (Q13(E)(1))	0.0%
2. PERCENT LOCATIONS THAT BELIEVE RESPONSE FEATURE WOULD GENERATE FEWER MESSAGES (Q13(E)(1))	60.0%
3. PERCENT LOCATIONS THAT BELIEVE NEW SERVICE WOULD REDUCE REPEAT CALLS TO PAGER (Q13(E)(2))	100.0%
4. PERCENT DISPLAY PAGING USERS WOULD SWITCH TO VOICE PAGING IF MESSAGE STORAGE AND ACKNOWLEDGEMENT AVAILABLE (YES TO Q13(E)(3)(A))	25.0%

Notes:

(1) Rows 1, 2, 3 data are from response to Q13e, current paging users.

(2) Row 4 data are from only responses to Q13(e)(3), current display paging users that are interested in new service at stated price.

(3) Estimates in this table are based on small sample sizes and should be used with caution.

Appendix

Questionnaire

QUESTIONNAIRE FOR NEW ORLEANS/BATON ROUGE SURVEY

[INTERVIEWER: ENTER SIC CODE AND ZIP CODE BEFORE DIALING.]

INTRODUCTION

HELLO. MY NAME IS _____. I WOULD LIKE TO TALK WITH THE INDIVIDUAL IN YOUR ORGANIZATION WHO HAS THE RESPONSIBILITY FOR PURCHASING YOUR COMMUNICATIONS SERVICES. COULD YOU TELL ME WHO THAT INDIVIDUAL IS?

[INTERVIEWER: GET THE NAME AND CALL BACK NUMBER, IF REQUIRED.]

WOULD YOU PLEASE TRANSFER ME TO THAT INDIVIDUAL?

[ONCE INDIVIDUAL COMES TO PHONE, CONTINUE:] HELLO. MY NAME IS _____. I'M CALLING FROM KCA RESEARCH, AN INDEPENDENT RESEARCH FIRM IN ALEXANDRIA. I WOULD LIKE TO ASK YOU A FEW QUESTIONS CONCERNING THE POSSIBILITY OF YOUR INTEREST IN A NEW PAGING SERVICE THAT IS A SUBSTANTIAL IMPROVEMENT OVER THE RADIO PAGING SERVICES NOW AVAILABLE IN YOUR METROPOLITAN AREA. THIS IS A RESEARCH SURVEY ONLY. WE ARE NOT SELLING ANYTHING. DO YOU HAVE TIME TO TALK BRIEFLY WITH ME NOW OR SHOULD I CALL BACK AT A BETTER TIME?

AVAILABLE NOW [CONTINUE]
CALL BACK LATER [RECORD DAY AND TIME TO CALL BACK]

FIRST, I WOULD LIKE TO VERIFY THAT I HAVE YOUR ZIP CODE RECORDED CORRECTLY. IS YOUR ZIP CODE _____? [IF NO, ASK: WHAT IS YOUR ZIP CODE?]

1. HOW MANY FULL TIME PEOPLE DOES YOUR ORGANIZATION CURRENTLY EMPLOY AT THIS LOCATION?

   _____ [GO TO 2]

2. DOES YOUR ORGANIZATION HAVE STAFF MEMBERS OR EMPLOYEES SUCH AS SALES REPRESENTATIVES, REPAIRMEN, FIELD WORKERS, PROFESSIONALS, OR OTHERS WHO WORK OUTSIDE YOUR BUSINESS LOCATION OR AWAY FROM YOUR TELEPHONE OPERATOR OR DISPATCHER?

   YES - [GO TO 3]
   NO - [END OF CONVERSATION]
   DON'T KNOW - [NOT TALKING TO PROPER PERSON; RETURN TO INTRO.]
   REFUSED - [END OF CONVERSATION]

3. DOES YOUR BUSINESS REQUIRE THAT THESE INDIVIDUALS BE READILY ACCESSIBLE TO RECEIVE INSTRUCTIONS OR TO BE AVAILABLE ON SHORT NOTICE?

   YES - [GO TO 4]
   NO - [END OF CONVERSATION]
   DON'T KNOW - [NOT TALKING TO PROPER PERSON; RETURN TO INTRO.]
   REFUSED - [END OF CONVERSATION]

4. DO YOU NOW USE MOBILE RADIO, CELLULAR TELEPHONE, OR PAGING SERVICES TO REACH EMPLOYEES OR STAFF MEMBERS?

   YES - [GO TO SUBPART (A)]
   NO - [GO TO 5. BELOW]
   DON'T KNOW - [GO TO 5. BELOW]
   REFUSED - [GO TO 5. BELOW]

   (A) HOW MANY INDIVIDUALS AT YOUR LOCATION NOW USE ANY OF THESE SERVICES? _____ [GO TO 5]

5. DO YOU NOW PLAN TO USE MOBILE RADIO, CELLULAR TELEPHONE, OR PAGING SERVICES TO REACH EMPLOYEES (IN THE FUTURE)?

YES - [GO TO SUBPART (A)]
NO - [GO TO 6. BELOW]
DON'T KNOW - [GO TO 6. BELOW]
REFUSED - [GO TO 6. BELOW]

(A) HOW MANY INDIVIDUALS AT YOUR LOCATION DO YOU NOW PLAN TO USE ANY OF THESE SERVICES (IN THE FUTURE)? _____
[GO TO DESCRIPTION OF NEW SERVICE]

6. WHY DON'T YOU USE OR PLAN TO USE A MOBILE RADIO, CELLULAR, OR PAGING SERVICE? [CODE UP TO TWO RESPONSES.] [ASK ONLY IF 4 AND 5 ARE ANSWERED "NO"]

COST OF PURCHASING EQUIPMENT
MONTHLY COST OF SERVICE
DON'T KNOW ABOUT SERVICES
OTHER (SPECIFY)
DON'T KNOW
REFUSED

[NOTE: IF THEY RESPOND THAT THEY DON'T NEED TO KEEP IN TOUCH WITH THEIR OFF-PREMISES PERSONNEL, CHECK THEIR RESPONSES TO 2. AND 3. ABOVE. IF THEY STILL DON'T NEED TO KEEP IN TOUCH, THEN END CONVERSATION. IF THEY DO NEED TO KEEP IN TOUCH, CONTINUE WITH 6.]

[GO TO DESCRIPTION OF NEW SERVICE]

DESCRIPTION OF NEW SERVICE:

AS MENTIONED AT THE BEGINNING OF THE CALL, OUR CLIENT IS CONSIDERING OFFERING A NEW AND DIFFERENT PAGING SERVICE WHICH WOULD COVER YOUR METRO AREA. WITH THIS NEW SERVICE, YOU WOULD HAVE A CHOICE OF USING A PAGER THAT EITHER TRANSMITS A VOICE MESSAGE OR DISPLAYS A MESSAGE ON A SMALL SCREEN. [NOTE: DISPLAY MESSAGE IS ALSO CALLED "ALPHA-NUMERIC OR "READOUT" OR "DATA MESSAGE" -- THE MESSAGE IS DISPLAYED ON UNIT'S SCREEN.] YOU ALSO WOULD HAVE THE CHOICE OF USING YOUR OWN LAPTOP OR HAND-HELD COMPUTER AS THE UNIT TO RECEIVE AS WELL AS TRANSMIT DISPLAY MESSAGES AND OTHER DATA. THE SERVICE WOULD BE UNIQUE IN THE FOLLOWING WAYS:

- FOR A MESSAGE DISPLAY, A MESSAGE COULD BE SENT BY EITHER PHONE OR COMPUTER.

- A MESSAGE DISPLAY COULD ALSO BE SENT FROM A LAPTOP OR A HAND-HELD COMPUTER OUT IN THE FIELD WITHOUT THE USE OF A PHONE. AND, ONE LAPTOP COMPUTER COULD COMMUNICATE WITH ANOTHER WITHOUT USE OF PHONE SERVICE.

- THE VOICE OR MESSAGE DISPLAY PAGER COULD STORE MESSAGES FOR LATER RETRIEVAL OR, IF DESIRED, THEY COULD BE SENT TO A SEPARATE ELECTRONIC MAILBOX SERVICE.

- THROUGH HIS OR HER PAGER OR HAND-HELD COMPUTER, THE INDIVIDUAL RECEIVING THE VOICE OR DISPLAY MESSAGE COULD NOTIFY THE INDIVIDUAL WHO SENT IT THAT HE OR SHE RECEIVED THE MESSAGE AND WILL TAKE A SPECIFIC ACTION.

- THE PAGER RESPONSES COULD BE CUSTOMIZED TO FIT THE PARTICULAR USER'S NEEDS, WITH SEVERAL DIFFERENT RESPONSES AVAILABLE, SUCH AS:

"I HAVE RECEIVED THE MESSAGE"

"PLEASE SEND MESSAGE AGAIN"

"I WILL GO LATER TODAY"

"I WILL GO TOMORROW"

QUANTIFICATION OF INTEREST:

7. HOW USEFUL WOULD IT BE IN YOUR BUSINESS TO BE ABLE TO SEND A VOICE MESSAGE TO A STAFF-MEMBER OR EMPLOYEE ANYWHERE IN YOUR METRO AREA--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?

   VERY USEFUL
   SOMEWHAT USEFUL
   NOT TOO USEFUL
   NOT AT ALL USEFUL
   DON'T KNOW
   REFUSED

8. HOW USEFUL WOULD IT BE IN YOUR BUSINESS TO HAVE THE CAPABILITY OF STORING A VOICE MESSAGE IN THE INDIVIDUAL'S PAGER--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?

   VERY USEFUL
   SOMEWHAT USEFUL
   NOT TOO USEFUL
   NOT AT ALL USEFUL
   DON'T KNOW
   REFUSED

9. HOW USEFUL WOULD IT BE IN YOUR BUSINESS TO BE ABLE TO SEND A DISPLAY MESSAGE TO A STAFF-MEMBER OR EMPLOYEE ANYWHERE IN YOUR METRO AREA--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?

   [NOTE: IF THEY RESPOND THAT THEY DON'T NEED TO KEEP IN TOUCH WITH THEIR OFF-PREMISES PERSONNEL, CHECK THEIR RESPONSES TO 2. AND 3. ABOVE. IF THEY STILL DON'T NEED TO KEEP IN TOUCH, THEN END CONVERSATION. IF THEY DO NEED TO KEEP IN TOUCH, CONTINUE WITH 6.]

   VERY USEFUL
   SOMEWHAT USEFUL
   NOT TOO USEFUL
   NOT AT ALL USEFUL
   DON'T KNOW
   REFUSED

10. HOW USEFUL WOULD IT BE IN YOUR BUSINESS TO HAVE THE CAPABILITY OF SENDING DATA SUCH AS PRICE QUOTES, INVENTORY, OR SUPERVISORY INSTRUCTIONS TO A HAND-HELD COMPUTER IN THE FIELD AND RECEIVE A BRIEF ACKNOWLEDGEMENT FROM THE COMPUTER, SUCH AS NUMBER OF JOBS COMPLETED, BILLING, OR ORDERS--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?

   VERY USEFUL
   SOMEWHAT USEFUL
   NOT TOO USEFUL
   NOT AT ALL USEFUL
   DON'T KNOW
   REFUSED

11. HOW USEFUL WOULD IT BE IN YOUR BUSINESS IF THE PERSON BEING PAGED COULD EASILY NOTIFY THE INDIVIDUAL WHO SENT THE MESSAGE THAT IT WAS RECEIVED--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?

   VERY USEFUL
   SOMEWHAT USEFUL

NOT TOO USEFUL
NOT AT ALL USEFUL
DON'T KNOW
REFUSED

12. HOW USEFUL WOULD IT BE IN YOUR BUSINESS TO BE ABLE TO SEND A PAGE OR DISPLAY MESSAGE FROM A PERSONAL COMPUTER, MOBILE LAPTOP, OR HAND-HELD COMPUTER WITHOUT THE NEED OF A TELEPHONE--WOULD IT BE VERY USEFUL, SOMEWHAT USEFUL, NOT TOO USEFUL, OR NOT AT ALL USEFUL?
[GO TO 13]

VERY USEFUL
SOMEWHAT USEFUL
NOT TOO USEFUL
NOT AT ALL USEFUL
DON'T KNOW
REFUSED

QUANTIFICATION OF UNITS

13. TO REPEAT, THE NEW PAGING SERVICE WOULD HAVE THE FOLLOWING DISTINCTIVE CHARACTERISTICS:

- THE ABILITY TO SEND A PAGE OR MESSAGE VIA TELEPHONE, COMPUTER, LAPTOP COMPUTER, OR HAND-HELD COMPUTER.

- THE PAGED INDIVIDUAL COULD TRANSMIT RESPONSES BACK TO THE INDIVIDUAL SENDING THE PAGE OR MESSAGE.

- THE PAGER COULD STORE THE MESSAGE FOR LATER RETRIEVAL, IF NECESSARY.

THE PURCHASE PRICE OF A VOICE OR MESSAGE DISPLAY PAGING UNIT IS EXPECTED TO BE IN THE RANGE OF $150-$200 WHILE THE MONTHLY SERVICE COST FOR EACH INDIVIDUAL IS EXPECTED TO BE APPROXIMATELY $10-$12 FOR 150 MESSAGES, PAGES, OR RESPONSES. ADDITIONAL PAGES OR RESPONSES ABOVE THAT MONTHLY ALLOWANCE WOULD BE FIVE CENTS EACH.

WITH THAT PRICING, WOULD YOUR ORGANIZATION IN THE FORESEEABLE FUTURE BE INTERESTED IN THE NEW SERVICE?

YES [GO TO (A)]
NO [END OF CONVERSATION]
DON'T KNOW [END OF CONVERSATION]
REFUSED [END OF CONVERSATION]

(A) TO HOW MANY INDIVIDUALS FROM YOUR LOCATION WOULD YOU PROVIDE THE SERVICE?

(B) HOW MANY PAGES OR MESSAGES WOULD YOU ESTIMATE WOULD BE SENT MONTHLY, ON AVERAGE, TO EACH INDIVIDUAL?

[IF THEY HAVE RESPONDED YES TO EITHER 4. OR 5., GO TO (C) THROUGH (E)]

(C) WOULD THIS NEW PAGING SERVICE REPLACE ALL OR SOME OF THE MOBILE RADIO, CELLULAR, OR PAGING SERVICES YOU NOW ARE USING OR PLAN TO USE?

(D) WOULD THIS NEW PAGING SERVICE BE IN ADDITION TO ALL OR SOME OF THE MOBILE RADIO, CELLULAR OR PAGING SERVICES YOU NOW ARE USING OR PLAN TO USE?

(E) ARE YOU CURRENTLY USING PAGING?

YES -- [GO TO (1) AND (2) BELOW]
NO -- [END OF CONVERSATION]

(1) WOULD YOU SEND MORE OR LESS PAGES OR MESSAGES IF YOU HAD THE RESPONSE FEATURE?

MORE
LESS
DON'T KNOW
REFUSED
SAME AMOUNT

(2) DO YOU THINK THAT THE RESPONSE FEATURE WOULD REDUCE REPEATED CALLS TO THE PAGER, SINCE YOU WOULD KNOW THAT THE INDIVIDUAL GOT THE MESSAGE?

YES
NO
DON'T KNOW
REFUSED

(3) DO YOU NOW HAVE DISPLAY MESSAGE PAGING SERVICE OR VOICE PAGING SERVICE?

DISPLAY MESSAGE PAGING SERVICE -- [GO TO (A) BELOW]
VOICE PAGING SERVICE [END OF CONVERSATION]
DON'T KNOW
REFUSED
BOTH
NEITHER

(A) IF IT WERE AVAILABLE, WOULD YOU SWITCH TO A VOICE SERVICE THAT COULD ACKNOWLEDGE RECEIPT OF THE PAGE AND STORE THE MESSAGE, IF NECESSARY?

YES OR NO.

YOUR RESPONSES HAVE BEEN MOST USEFUL. THANK YOU VERY MUCH FOR YOUR TIME AND COOPERATION.

ARNOLD GREENLAND, PH.D.

Executive Vice President

Dr. Greenland is a survey research statistician and operations research analyst with a wide range of experience in survey design, survey operations, and data analysis as well as extensive experience as a project manager. He has worked in the survey and market research field for more than 20 years.

Dr. Greenland has designed numerous national surverys for both Government and private clients. Governmental clients include the Department of Labor's Occupational Safety and Health Administration (OSHA), the Environmental Protection Agency (EPA), the National Oceanic and Atmospheric Administration (NOAA), the Veteran's Administration, and the Department of Transportation. Surveys designed for private clients include those for both large Fortune 500 companies as well as smaller clients, and they are comprised of both manufacturing and service sector companies.

Dr. Greenland is experienced in a wide range of statistical procedures and methods. With respect to survey and market research areas, he has experience in weighting and adjusting survey estimates, developing data cleaning and imputation methods, and developing estimates of survey errors. In the wider statistical area, Dr. Greenland has performed complex statistical analysis of environmental data for the EPA, designed statistical experiments, performed multivariance analysis on both large and small databases, and developed simulation models based upon survey and statistical results.

Dr. Greenland is also experienced in a wide range of computer hardware and software. These include microcomputers, minicomputers, workstations, and mainframes. He is experienced with a broad range of statistical software packages including SAS, SPSS, NCSS, ABSTAT, Statgraphics, and BMDP as well as several high level languages such as FORTRAN and BASIC.

Dr. Greenland has written numerous reports and research papers for Governmental and private clients as well as writing referred professional articles and delivering papers at meetings. He has regularly served as an expert statistical consultant on submissions of statistical materials to the Office of Management and the Budget (OMB), the results of which have been published in the Federal Register.

Prior to joining KCA, Dr. Greenland worked as a statistical consultant. He also held a full time faculty appointment at George Mason University for several years; he is currently a part time faculty member at the George Washington University.

A list of publications is available upon request.

Declaration of Arnold Greenland

on Behalf of Freeman Engineering Associates, Inc.

I, Arnold Greenland, hereby state the following:

I am a senior statistician and Executive Vice President with the KCA Research Division of David C. Cox & Associates, Inc., a survey and market research firm, located in Alexandria, Virginia. I have been associated with Cox Associates for one and one-half years, and I have had the title of Executive Vice President for ten months. Prior to that I have served in several management, technical, and academic positions which have involved statistical survey design and analysis and the analysis of statistical data. I had direct technical direction of the market survey of the proposed new paging service in the New Orleans/Baton Rouge and Dallas/Ft. Worth areas, and certify that statistical design of the survey, selection and administration of the sample, and the analysis of the data were performed according to industry and professional standards. A brief resume is attached.

Executed: November 6, 1992

Signed: Arnold Greenland

Arnold Greenland

Attachment 2

DESCRIPTIVE MATERIAL SENT TO PAGING SERVICE OPERATORS

TOTAL PAGES: 3 **November 8, 1992**

FAX TO: XXXXXXXXXXX
XXXXXXXXXXX

FROM: Toni Crowder/Fred Kelsey
TRANSCOMM, Inc.

SUBJECT: New Paging Technology and Service Enhancements

We are representing a radio carrier in another state that is requesting from the FCC a national allocation of frequencies in the 930-931 mHz range for advanced paging and messaging services. These frequencies, together with new digital technology, would be used to provide new, local paging and messaging services. All three services require entirely new technology, new paging equipment, and more frequency bandwidth.

The following is a brief description of the technology and services. Please review it and consider whether, in your service area(s), there is an unfilled demand for voice paging now and whether there would be a demand for the other service enhancements described below. Additionally, would your system(s) be interested in licensing the frequencies, using the technology, and providing the advanced services? In your considerations, please assume that the technologies are readily available for these new services and would yield pager prices of approximately $150-$200 and service prices equivalent to your current paging service prices. Also assume that the capacity of the system on a per kHz basis is many times greater than with today's technology.

I will call you within the next few days and would appreciate your comments (or questions) on the need for these new technologies, frequencies, and services.

Thanks for your consideration.

BRIEF DESCRIPTION OF NEW TECHNOLOGY AND SERVICES TO BE ASSOCIATED WITH REQUESTED 930-931 MHZ SPECTRUM ALLOCATION TO PAGING

The key distinction in the new technology is that signal transmission from base station to mobile units for all services will be integrated into one wideband 150 kHz channel, thus cutting the operational cost of the infrastructure equipment while also greatly increasing the per kHz paging capacity for both voice and display messages. At the base station, a single terminal or switch would be able to control all of the above services in one homogenous system.

In addition, the requested frequencies would be used to establish a set of 56 kHz channels over which the pagers and portable computers (equipped with transceivers) can transmit limited responses or data dispatches. Geographically scattered receivers will pick up the low-powered signals from these mobile units and relay them to the base station.

This new technology, if implemented, would support three basic services plus innumerable value-added applications for each of the three basic services. The basic services are envisioned as follows:

Voice Paging - This service is provided through a tone and voice pager. A page is initiated through a telephone. The short voice message (up to 15 seconds) is digitized, compressed and transmitted in digital form from the base station to the pager which then decodes, reconstructs, and produces the short voice message (the voice is recognizable). The pager is capable of storing up to five voice messages for later retrieval. It is also capable of transmitting a pre-determined coded response back through the base station to the initiator. There may be more than one pre-determined response code from which the paged individual can chose or the response can be automatic. The coded responses are customized, pre-determined short messages which correspond to codes on the pager. The paged individual can choose the coded response and it is transmitted back to the base station terminal which converts the code to a synthesized voice or numeric/alphanumeric message. That message can then be forwarded, as specified, to a telephone, voice or e-mail box, or computer printer/screen.

The key distinctions between this new voice paging service and current offerings of voice paging are (1) it is high-capacity, capable of providing voice paging service to many subscribers, (2) it is wide-area, capable of being clearly transmitted by simulcast, and (3) it provides for a pager-transmitted response code. Value-added service features can also include, for example, message repeat, message forwarding, and integration with an electronic mail or voice-response system. These value-added applications can be customized as appropriate.

Numeric and Alphanumeric Display Paging - This service is provided through a tone and display pager. A short page or message (typically about 24 characters for a numeric and 80 characters for an alphanumeric) is initiated by phone or computer. The message is received by the pager and displayed on the pager's screen. The pager is capable of storing many alphanumeric messages for later retrieval. It is also capable of transmitting a pre-determined coded response back through the base station to the initiator. There may be

more than one pre-determined coded response from which the paged individual can chose or the response can be automatic. The coded responses are customized pre-determined short messages which correspond to codes on the pager. The paged individual can choose the code and it is transmitted back to the base station terminal which converts the code to a synthesized voice or numeric/alphanumeric message. That message can then be forwarded, as specified, to a telephone, voice or e-mail box, or computer printer/screen.

The key distinction between this new message display paging service and current offerings is that it provides for a pager-transmitted response code. Value-added service features can also include, for example, message repeat, message forwarding, and integration with an electronic mail system.

Wireless Data Transmission - this service is provided through the use of portable laptop or small hand-held computers with radio transceivers attached. This service allows the radio transmission of data to and from the portable computers. Transmission can be from a fixed station computer to a portable computer, from a portable to a fixed station, of from one portable to another. Transmission from fixed computer to a portable can be as much as 56 kbps while transmission from a portable to a fixed computer or another portable would be 9.6 kpbs. It is expected that the portable computer would be used for short responses using a short, fast burst on a CDMA channel.

Attachment 3

ANTOINETTE CROWDER

SENIOR ANALYST

EDUCATION

B.S. in Biology, University of Virginia; M.S. in Biology, George Mason University. Ms. Crowder's education also includes course work in economics, accounting, and statistics.

PROFESSIONAL EXPERIENCE

Over the past nineteen years, Ms. Crowder has participated in numerous TRANSCOMM domestic and international projects, spanning all aspects of telecom and postal economics and finance. Her activities have included (a) costing, pricing and tariff development; (b) industry structure, market analysis and policy assessment; and (c) systems analysis. Examples of activities in the pricing area include telecom and postal rate of return analysis, embedded and incremental cost studies, rate structure development, assessment of rate design impacts on ratepayer demand, and tariff preparation.

Ms. Crowder has also participated in TRANSCOMM's many analyses concerning PTT privatization, regulation, and telecom sector liberalization, as well as private investor acquisition evaluations. In many of these analyses, a key requirement was an evaluation of the industry and its current or proposed regulatory structure. Additionally, she has also contributed substantially on a variety of other international and domestic telecom projects. Examples of projects in this area include: evaluation of the domestic and international policies of several countries on international carrier market structure and service levels; market structure and demand projections for several different satellite service applications; assessment of market entry requirements and constraints in the U.S. and other countries for certain telecom hardware and software; evaluation of cost and demand projections for U.S.-international voice and private line services; and analysis of the long-term impact on local exchange networks of deregulation and competitive entry of alternative suppliers.

At the systems level, Ms. Crowder has performed cost/benefit analyses of alternative satellite, microwave, and fiber optic transmission systems as well as central office/customer premises switching systems. Some of these activities have included analysis of UHF vs. L-Band spectrum use for certain satellite services; satellite vs. fiber optics technology for certain long-haul transmission requirements; microwave vs. cable for local/ regional network requirements; and alternative tandem, centrex and customer premises switching arrangements for a private national network. Recently, she has investigated newer technologies designed to facilitate development of local exchanges.

In addition to her work in the telecom and postal area, Ms. Crowder has also contributed to TRANSCOMM projects concerning the electric and gas industries.

Declaration of Antoinette Crowder

on Behalf of Freeman Engineering Associates, Inc.

I, Antoinette Crowder, hereby state the following:

I am a senior analyst with TRANSCOMM, Inc., an engineering and economic consulting firm located in Falls Church, Virginia. I have been associated with TRANSCOMM for over 19 years and, during that time, have been involved in a variety of projects dealing with cost, pricing, market studies, economic and financial analyses, and research on numerous regulatory and policy issues. Most of these activities have dealt with the telecommunications, electric power, gas, and postal/publishing industries. In particular, I have been involved in conducting market research and preparing demand projections to a number of TRANSCOMM radio-telephone, paging and cellular clients. My resume is included in the report as Attachment 3.

Executed: November 9, 1992

Signed: 

Antoinette Crowder

ATTACHMENT C

SEPTEMBER 1992

TURNING PROSPECTS INTO PROFITABILITY

IMCE/FALL OFFICIAL SHOW ISSUE

Reprinted from *Communications*, September 1992

THE INDUSTRY

WILL PAGING SURVIVE?

Even though paging is constantly challenged by new types of mobile communications services, it is one of the most viable services in existence.

By Harrell Freeman
Freeman Engineering Associates

In the beginning, there was broadcast band radio, and everyone listened to the news of the world around them; laughed at the jokes of Edgar Bergen and Charlie McCarthy and "Amos & Andy;" and danced to Dixieland and Swing.

Those who had the need were assigned frequencies by the Federal Communications Commission just above this band for broadcast by high-powered transmitters. These signals were received by vehicles in the field, and this technology was utilized by government agencies and local police departments. In retrospect, this was the inception of paging in the United States. There are even pictures, dating from the 1930s, of people wearing large, portable tube-type receivers on their belts.

Paging had arrived. A need had arisen, and the marketers provided the product, furnished to them by the engineers of vision. As with all products and technologies, the day of birth began the countdown to paging's obsolescence, and its replacement by the latest and most desirable products available. The clock was ticking.

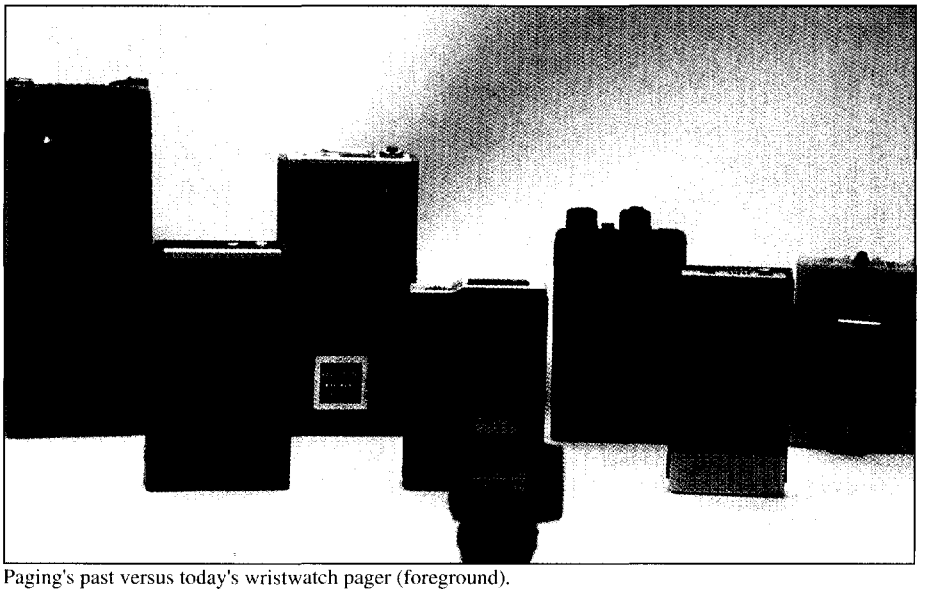
THE INITIAL ASSAULT

The first assault on paging was the two-way radio. With this device, a person could not only receive a message, but could also acknowledge its receipt and discuss the situation with the dispatcher through the base station. This technology was obviously the replacement for the pager, and the pager's days were surely numbered, right? Wrong.

Paging receivers didn't sit around and gather dust, either. The technology continued to develop as long as the interest continued its spiraling growth. A smaller portable paging receiver was the next introduction into the marketplace. This unit was, in actuality, the equivalent of a frequency monitor. The unit had to be operated manually by turning on a switch, and the user heard a continuous recording of messages such as: "four-one-five, call your office," or "two-two-two, call the hospital." Users listened to the entire tape until they were sure they had heard all of the messages and ascertained that none of them were theirs. It usually took several listens to determine that the end had been reached, and the messages were being repeated. The tapes were changed periodically, and when users noticed the messages were different, they began the listening regimen all over again. In larger cities, subscribers could potentially listen for a long time in order to get their messages.

This was not the most convenient method of message retrieval, but the units were smaller and more convenient to carry, and allowed individuals a degree of freedom they had not previously experienced. The market continued to grow, and the clock continued to count down.

The next entry into the arena was the hand-held, two-way radio, with all of its attendant convenience, including portability and the ability to talk back to the dispatcher. This was obviously going to



Paging's past versus today's wristwatch pager (foreground).

spell disaster for the paging market.

Paging not only survived the newest onslaught of technology, but evolved into a service that the non-emergency worker could begin to justify and utilize. Radio Common Carriers began aggressive marketing of these smaller and more efficient units. In a fairly short span of time, pagers incorporated selective call tone paging, digital readout paging, and alphanumeric paging. Pages could be sent to one person locally, area-wide, and even nationally. Paging was back in the spotlight once again.

Greater demands for paging service created numerous RF advances within the spectrum. Once the signals were digitized, the increase in the number of pages per minute, per frequency created new marketing philosophies which arrived during the "merger mania" period of the '80s. The end results were pagers that were affordable to most of the public. Private Carrier Paging emerged, and the interest in paging continued to grow at an amazing rate. Large paging operators began merging the subscriber databases into their systems as they brought networking from city to city. Large regional systems were in vogue.

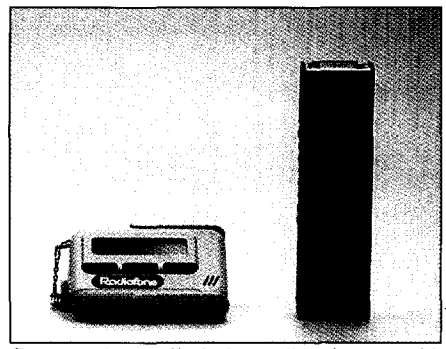
This created the need for newer terminal technologies which allowed for the networking of systems and databases, and faster baud rates for digital paging transmitters and receivers, allowing more characters in less time to pass through the airwaves. Satellite technology with its downlink capabilities came into play, and the world was full of pages. But the clock was still ticking.

CELLULAR STRIKES

Then cellular arrived. The end was obviously at hand for paging. If one could make and receive a phone call on a portable receiver in full-duplex and take this wondrous technology into the home, office, car, or even restaurant, why would anyone need a pager?

As it has come to pass, cellular has not spelled the demise of the pager. Cellular is more costly and is not suitable for all applications and business situations. Paging has, in fact, flourished in spite of cellular, and maybe to some extent, as a result of cellular.

The general public is relatively new to various communications techniques and the benefits which can be garnered from their application in day-to-day



Compare the small, designer digital pager with yesterday's tone-only pager.

business and personal life. As the public becomes more aware and as society continues down the road to communications sophistication, their demands become more complex and frequent. The need to communicate rapidly and accurately gives rise to the need for all forms of communications devices.

Just a few years ago, it was perfectly acceptable to type a letter on a Smith-Corona mechanical typewriter using carbon paper and have a secretary walk down the street to the post office to mail it. Now, fax machines and direct computer to computer communications are barely fast enough to satisfy the daily demands of our fast-paced business and personal lives. Technology stands still for no one. Tomorrow is here (once again) today.

THE TERMINATOR

Now the real paging "terminator" has arrived. Its name is PCN (Personal Communications Networks). PCN is a very sophisticated and diversified personal communications tool which will allow one to utilize his/her own individual portable handset. The initial units to reach the market are quite small, even by cellular standards. These units are lightweight and relatively inexpensive, and compare favorably to the cordless telephones which the public has become accustomed to using within their homes. If so desired, a subscriber can be assigned a single telephone number which can be utilized by the PCN handset at home, the office, or anywhere the unit is carried.

The provision of PCN is the concept that it can represent all things to all people. PCN can be a telephone, a pager, one's ticket to personal freedom from being tied down to a single location. The real selling point is that PCN is touted as being inexpensive to boot.

The obvious conclusion is that PCN spells the end for paging. Once this technology is fully deployed, no one will need a pager. But that is not the reality. Based on current and ongoing market trends and the continued growth of paging systems, pagers will have a place and will continue to flourish in spite of PCN. According to Tom Stroup, president of industry trade association Telocator, "...Paging will continue to be the most cost-effective and ubiquitous form of wireless communications, even when PCN is developed. PCN subscribers will use paging for the same reason that portable cellular telephone subscribers do: it is a less expensive and less obvious means of receiving a message. Furthermore, with the development of advanced messaging systems, paging subscribers will be able to obtain data much more efficiently than they could through a PCN system."

The key ingredient in message management is management. It is as important for subscribers to maintain control of their own personal messages as it is for them to maintain control of their own lives. They are, in fact, one and the same. Time management is the management of perhaps the most critical and non-renewable of all resources. Message management allows customers to take calls when they desire and to defer calls when they wish to do other, and often more important tasks. Within the concept of PCN filed by Freeman Engineering in its Pioneer's Preference Request to the FCC, message management is a key ingredient.

In one scenario, customers have the option as to whether or not they wish to have a single number assigned to all incoming calls. If they so desire, incoming calls are sent to their PCN unit at their residence when they are at home. When they are in their vehicles, calls are then forwarded to their mobile cellular phones. When they arrive at their offices, calls are forwarded to the teleport that services their office locations. If they do not wish to be available to take all calls, customers can have calls routed to their voice retrieval systems which take the messages and then send pager alerts.

Another common scenario is the situation where an executive doesn't wish his subordinates to have two-way capa-

bility, but he still wishes to have them available at his beck and call. The pager fits this bill perfectly. Many situations arise on a daily basis where an open two-way conversation in public is neither desirable nor in good taste, such as in a business meeting, in church, or other public gatherings. A silent page is in order in these circumstances. On the opposite side of the spectrum, there are many situations in which a pager won't suffice and immediate two-way communication is required. The PCN phone will be necessary for day-to-day management of business while sitting at the desk or walking around the office building. There are, however, situations in which call screening is desirable within this environment. Call management becomes the link between paging, PCN, cellular, and the wireline telephone network.

PAGING KEEPS RUNNING

PCN has a place in the future of communications technologies. Paging will retain its place within the same customer base. Each will benefit the other's advances and acceptance. PCN will be a wonderful addition to the portfolio of devices available to the public. Its small size and lightweight configuration, in conjunction with its projected low costs, should make PCN available to a much larger segment of the public than can currently take advantage of cellular systems. The lower costs should also allow more applications to be available for the utilization of PCN than are currently accessible for cellular. The end result should most assuredly be that a better ability to communicate will be within the reach of more people.

Paging has not exactly been standing still—it is expanding. Skytel's U.S. nationwide paging system is now available in Canada, Mexico, Asia, and other overseas destinations. At the opposite end of the spectrum, various companies are discovering how to operate more economically in small systems. For example, rural paging is coming of age. Recent advanced messaging proposals presented to the FCC will allow the availability of new tone-voice paging, for which these markets are starved.

Pagenet and Freeman Engineering have submitted such proposals to the FCC. Various other techniques which are making paging more efficient and thus more affordable have been perfected and brought to market. These include SkyTel's 2400 baud paging and response paging by DialPage.

The end of paging may not arrive within our lifetimes. Any product which has the apparent flexibility and inherent marketing niches that paging has been able to demonstrate deserves to live on. In fact, in the hands of up-and-coming engineers and marketers of the future, paging may outlast watches that tick. □

About the Author

Harrell Freeman is vice president of Freeman Engineering Associates, located in Metairie, La. He is also vice president of Radiophone Inc., and is a registered professional engineer.

CERTIFICATE OF SERVICE

I hereby certify that I am an attorney with the law offices of Blooston, Mordkofsky, Jackson & Dickens, and that on this 9th day of November, 1992, I caused to be mailed by first class United States mail, postage prepaid, a copy of the foregoing "**Comments and Supplemental Information of Freeman Engineering Associates, Inc.**" to the following:

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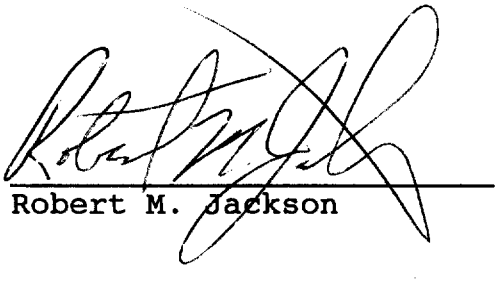

Robert M. Jackson